GURU KASHI UNIVERSITY
PUNJAB - INDIA

Program Syllabus Booklet

Master of Technology in Structure Engineering
Program Code: 148

Session: 2018- 19

GURU KASHI UNIVERSITY
PUNJAB - INDIA

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Annexure - 1

Program Name: Master of Technology in Structures Engineering
Program Code: 148
The Program Outcomes (POs) for the Program Master of Technology in Structure Engineering are as follows:

PO	Statement
1	**Engineering knowledge:** Apply the advance knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex and advanced engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	**Design/development of solutions:** Design advanced solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct investigations of complex problems**: Effectively Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	**Environment and sustainability:** Understand the impact of the advance professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Individual and team work:** An ability to independently carry out advance research /investigation and development work to solve the practical problems.
9	**Communication:** An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
10	**Project management and finance:** Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should

	be at a level higher than the requirements in the appropriate Master program.
11	**Life-long learning:** Ability to Analyze, evaluates, and select computer applications for the purpose of efficient and effective construction project management.
12	**Ethics:** Enhance the ability to Analyze construction projects related to fundamental aspects of construction management (i.e., cost, schedule, quality, safety, ethics) and develop appropriate solutions

The Program Specific Outcomes (PSOs) for the Program Masters of Technology in Structures engineering are as follows:

PSO	**Statement**
PSO1	Enhancing the employability skills by making the students capable of qualifying National level competitive examinations.
PSO2	Inculcating in students technical competencies to deal with practical aspects of civil engineering.
PSO3	Enforcement of environmental legislation and Public awareness related to civil engineering.

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Annexure - 2

Study Scheme										
Semester: 1st										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	148101	Dynamics of Structures	T	4	0	0	4	50	50	100
2	148102	Bridge Engineering	T	4	0	0	4	50	50	100
3	148103	Theory and Design of Plates and Grids	T	4	0	0	4	50	50	100
4	148104	Pre Stressed Concrete Structures	T	4	0	0	4	50	50	100
5	148105	Advanced Structural Analysis	T	4	0	0	4	50	50	100
Total No. of Credits							20			
Study Scheme										
Semester: 2nd										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	148201	Plastic Analysis and Design of Steel Structures	T	4	0	0	4	50	50	100
2	148202	Computer Aided Design Methods	T	4	0	0	4	50	50	100
3	148203	Industrial Structures	T	4	0	0	4	50	50	100
4		**Elective-I**	T	4	0	0	4	50	50	100
5		**Elective-II**	T	4	0	0	4	50	50	100
Total No. of Credits							20			

Elective-I (Select one of the following Courses)		
1	148204	Expert System in Civil Engineering
2	148205	Advanced Foundation Engineering
3	148206	Probabilistic Methods in Civil Engineering
Elective-II (Select one of the following Courses)		
1	148207	Instrumentation and Model Simulation
2	147208	Solid Mechanics

3	146209	Advanced Structure Design and Detailing								

Study Scheme										
Semester: 3rd										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1		Elective-III	T	4	0	0	4	50	50	100
2		Elective-IV	T	4	0	0	4	50	50	100
3	148307	Major Project	P	0	0	8	4	60	40	100
4	148309	Seminar	P	NA	NA	NA	2	100	NA	100
Total No. of Credits							14			
Elective-III (Select one of the following Courses)										
1	148301	Theory and Design of Shells								
2	148302	Finite Element Methods								
3	148303	Composite Materials								
Elective-IV (Select one of the following Courses)										
1	148304	Construction and Maintenance Management								
2	148305	High Rise Buildings								
3	148306	Disaster Reduction and Management								

Study Scheme										
Semester: 4th										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	148401	Dissertation	T/P	NA	NA	NA	20	500	500	1000
Total No. of Credits							**20**			

1: Each theory paper examination will be of three hours duration.

2: Seminar will be indepent study on the related topic & will be evaluated internally.

3: Thesis will be evaluated by External Examiner and internal guide the candidate is required to make presentation on required thesis work and viva voce will be held.

Annexure-3

Course Name: Dynamics of Structures
Course Code: 148101

Semester: 1st

Credits: 04

L	**T**	**P**
4	0	0

Course Outcomes: On completion of this course, the successful students should be able to:

CO	Statement
CO1	Construct of ILD for reactions, S
CO2	Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition
CO3	Analyze the beam-columns
CO4	Analyze the skeleton structures by using matrix method
CO5	Solve civil engineering boundary value problems

Course Contents

Module 1:Introduction, Systems with single degree of freedom (SDOF) Equation of motion – Analysis of free vibration-response to harmonic, impulsive, periodic and general dynamic loadings, forced and free vibration response of MDOF damp and undammed discrete systems-equation of motion- evaluation of natural frequencies and modes – approximate methods, overview of dynamics of continuous elastic systems-flexural beams-shear beams-columns, base excited system-formulation of equations for SDOF & MDOF systems-concepts of spectral quantities and response spectrum-fundamental of earthquake Engineering, computational and numerical methods-solution of eigen value

problems mode superposition method and modal truncation errors-modal acceleration method, direct integration method- explicit and implicit methods.

References:

1. Dynamics of Structures by Clough and Penzien

2. Mechanical Vibrations by G.K. Grover

3. Dynamics of Structures by Walter C. Hurty & Moshe F. Rubinsten

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/	P	P	P	P	P	P	P	P	P	P	P	P	PSO	PSO	PS

CO	O 1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	O 10	O 11	O 12	1	2	0 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1. 8**	**1.5**	**1.5**	**1.6**	**2. 2**	**2.6**	**2. 2**	**2. 6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: BRIDGE ENGINEERING

Course Code: 148102

Semester: 1st

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to:

CO	Statement
CO1	Study various components and loadings on bridge.
CO2	Analyze and design of super-structure of various bridges and flyovers.
CO3	Analyze and design of sub-structure of various bridges and flyovers
CO4	It will enhance the skills of the Students
CO5	perform critical design of typical shell structures

Course Contents

Module 1: Introduction-definition and components of bridges. Layout and planning of bridges-classification, investigations for bridges, preliminary data collection, choice of type of the bridges, hydraulic design of bridges, traffic design of bridges.

Module 2: Analysis and design of superstructure of straight and curved bridge decks-loadings details, specification-reinforced concrete and steel decks. Decks of various types like slab, hollow and voided slab, beam and slam, box girder etc.

Module 3: Design of substructure-piers and abutments of different types. Analysis and design of foundations- shallow foundations (open Foundations), deep foundations- well foundations and caisson.

Module 4: Design and constructional aspects of foundations. Modern methods of construction of concrete and steel bridges- their impact on the analysis and the design. Introduction to analysis and design of long span bridges like suspension and cable stayed bridges.

Module 5: Special aspects in analysis and design, based on construction methodology. Inspection and maintenance and rehabilitation of bridges.

References:

1. Bridge Deck analysis by Pama & Gusens

2. Bridge deck behavior by Edward V. Hambly

3. Essentials of bridge engineering by D. Johnson Vector

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	1	1	2	1	2	2	2	2	2	2
CO2	3	3	3	3	2	1	1	1	2	3	1	2	3	3	3
CO3	3	3	3	3	2	1	1	2	1	3	1	2	3	2	3
CO4	3	3	3	3	2	1	1	2	1	3	1	2	2	2	3

CO5	3	3	3	3	2	1	2	1	2	3	1	2	3	3	3
Average	**2.8**	**2.8**	**3**	**3**	**2**	**1**	**1.2**	**1.6**	**1.6**	**2.8**	**1.2**	**2**	**2.6**	**2.4**	**2.8**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Theory and Design of Plates and Grids
Course Code: 148103

Semester: 1st

L T P
Credits: 04 **4 0 0**

Course Outcomes: On completion of this course, the successful students should be able to:

CO	Statement
CO1	understand the equilibrium theories for analysis of plates and shell structures in civil engineering applications
CO2	perform critical analysis of typical shell structures
CO3	understand various methods for analyzing grids for roofs and bridges
CO4	It will enhance the skills of the Students
CO5	perform critical design of typical shell structures

Course Contents

Module 1: Plate equation in Cartesian and polar coordinates rectangular isotropic plat and circular plates with different boundary conditions and loading-energy methods in analysis of plates-orthotropic plates on elastic foundations.

Module 2: Analysis and design of Grids. Various methods of analyzing grids for roofs and bridges distribution of concentrated loads to various beams of grid floors and bridge decks.

References:

1. Theory of Plates and Shells by Timoshenco, S.

2. Theory and analysis of Plates by Szilard, R.

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	1	1	2	1	2	2	2	2	2	2
CO2	3	3	3	3	2	1	1	1	2	3	1	2	3	3	3
CO3	3	3	3	3	2	1	1	2	1	3	1	2	3	2	3
CO4	3	3	3	3	2	1	1	2	1	3	1	2	2	2	3
CO5	3	3	3	3	2	1	2	1	2	3	1	2	3	3	3
Average	**2.8**	**2.8**	**3**	**3**	**2**	**1**	**1.2**	**1.6**	**1.6**	**2.8**	**1.2**	**2**	**2.6**	**2.4**	**2.8**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Pre Stressed Concrete Structures

Course Code: 148104

Semester: 1st

Credits: 4

L T P
4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Explain the concept of pre-stressing, behavior of the pre-stressed structures vis-à-vis that of the RCC structure.
CO2	Choose the decision with respect to the choice of pre-stressed section over RCC.
CO3	Describe the application of these techniques in civil engineering construction.
CO4	Analyze the various pre-stressed components of the structures and design the same.
CO5	Design the various pre-stressed components of the structures

Course Contents

Module 1: Limit state design of statically determinate pre-stressed beams- limit state of collapse by flexure, shear, and torsion limit state of serviceability. Anchorage zone stresses for post-tensioned members. Statically indeterminate structures – analysis and design-continuous beams and frames. Choice of profile, linear transformation, concordances, domically viable profile. Composite beam with precast prestressed beams and cast in situ RC slab-analysis and design. Time dependant effects such as creep, shrinkage etc. on composite construction inclusive of creep relaxation and relaxation creep- partial prestressing principles, analysis and design of simple beams, crack and crack width calculations. Analysis and design of prestressed pipes, tanks and spatial structures-slabs, grids, folded plates and shells.

References

1. Prestressed concrete structures – Lundy.

2. Prestressed concrete – T.Y. Lin.

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	1	1	2	1	2	2	2	2	2	2
CO2	3	3	3	3	2	1	1	1	2	3	1	2	3	3	3
CO3	3	3	3	3	2	1	1	2	1	3	1	2	3	2	3
CO4	3	3	3	3	2	1	1	2	1	3	1	2	2	2	3
CO5	3	3	3	3	2	1	2	1	2	3	1	2	3	3	3
Average	**2.8**	**2.8**	**3**	**3**	**2**	**1**	**1.2**	**1.6**	**1.6**	**2.8**	**1.2**	**2**	**2.6**	**2.4**	**2.8**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Advanced Structural Analysis

Course Code: 148105

Semester: 1st

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Analyze and design of the RCC structures such as building, retaining wall, flat slab and foundations using standard software packages.
CO2	Interpret the results of analysis and design obtained from the software.
CO3	Prepare drawings of detailing of structural elements
CO4	Describe the application of these techniques in civil engineering construction.
CO5	Analyze the various pre-stressed components of the structures and design the same

Course Contents

Module 1: Matrix methods in skeletal structural analysis, force and displacement methods including analysis using substructures. Nonlinear analysis due to plasticity of frames, analysis of plates, folded plates and singly curved shells, conventional and approximate methods.

References:

1. Analysis of framed structures- J.M.Gere and W.Weaver.

2. Computer programming and Engineering analysis – I.C.Syal and S.P.Gupta

3. **The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	1	1	2	1	2	2	2	2	2	2
CO2	3	3	3	3	2	1	1	1	2	3	1	2	3	3	3
CO3	3	3	3	3	2	1	1	2	1	3	1	2	3	2	3
CO4	3	3	3	3	2	1	1	2	1	3	1	2	2	2	3

CO5	3	3	3	3	2	1	2	1	2	3	1	2	3	3	3
Average	**2.8**	**2.8**	**3**	**3**	**2**	**1**	**1.2**	**1.6**	**1.6**	**2.8**	**1.2**	**2**	**2.6**	**2.4**	**2.8**

4. The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Plastic Analysis and Design of Steel Structures
Course Code: 148201

Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Design steel structures and frames by varying methods.
CO2	Design various connectivity of structure as per code provisions.
CO3	Apply principles of ground improvement techniques.
CO4	Assess the most appropriate ground improvement techniques in specific circumstances
CO5	Carry out laboratory and in situ tests for soil improvement.

Course Contents

Module 1: Ductility of metals: Concept of plastic design, over loaded factors, ultimate load as design criteria.
Module 2: Hinge formation in indeterminate structures, Redistribution of moments, Assumption made for structures subjected to bending only.
Module 3: Minimum weight design: concept, assumptions, Design of frame with prismatic measures, Elements of linear programming and its application to minimum weight design problems.
Module 4: deflections: Assumption, calculation of deflection at ultimate loads, permissible rotations.
Module5: Secondary design considerations: Influence of direct load, shear, local buckling, lateral buckling, repeated loading and brittle fracture on moment capacity design of eccentrically loaded columns.
Module 6: Problem of incremental: collapse, shake down analysis.
Module 7: Special consideration for design of structures using light gauge metals.

References

1. Prestressed concrete structures – Lundy.

2. Prestressed concrete – T.Y. Lin.

3. **The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Computer Aided Design Methods

Course Code: 148202
Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Use personal settings to configure CAD tools using startup drawing and startup templates.
CO2	Design and create 3D Solid Models using standard AutoCAD features.
CO3	Use Xrefs and Attributes for individual designs and team projects.
CO4	Create a 3D walkthrough video
CO5	Create a CAD Project Presentation.

Course Contents

COMPUTER AIDED DESIGN METHODS (148202)

Module 1: Introduction to CAD and its scope simple description of computer hardware.

1. Micro, mini etc.
2. memory, processor
3. Peripheral devices-disks, printer. Video terminals. Graphic floater, graphic screen
4. Digitizer.

Module 2: Computer Graphics: introduction, point plotting techniques, line drawing displays, two-three dimensional transformation, clipping and windowing, segmentation geometric modeling. Three dimensional graphics, curves and surfaces, hidden surface elimination, shading.

Module 3: Graphic input devices. Graphic input technique, input functions.

Module 4: Raster graphic fundamentals, interactive raster graphics, raster graphic systems.

Computer aided linkage displays and synthesis, interactive acceleration analysis.

Module 5: Appreciation of graphic packages. Matrix methods of structural analysis and associated computer programme assembly of matrices. Solution of equilibrium equations. Flow charts. Typical listing as illustrations. Introduction to interactive computer programme for the design detailing of simple structural elements: RCC slab, beams, columns, isolated footings etc. Steel typical members and connections.

Module 6: Data base management, storing and retrieving of data.

References:

1. Principles of interactive computer graphics by William M. Newman & Robert F.Sproul.
2. Programming in Finite Element by Hunton and owan.
3. Principles of Computer Aided design by Joe Rooney & Philips Steadman.

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Industrial Structures
Course Code148203
Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Construct of ILD for reactions, S.F. and B.M. for indeterminate structures
CO2	Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition
CO3	Analyze the beam-columns
CO4	Analyze the skeleton structures by using matrix method
CO5	Solve civil engineering boundary value problems

Course Contents

Module 1: Planning of industrial structures: Design of single ad multibay industrial structures in steel.
Module 2: Bunkers & Silos In steel
Module 3: Liquid retaining structures in steel
Module 4: Pressure vessels & chimneys in concrete
Module 5: Cooling tower in concrete
Module 6: Structural aspects /design of machine, foundation in concrete

References:

1. Planning of industrial structures by C.W. Dunham.
2. Structural Engineers Handbook.
3. Design of steel structures-S.K.Duggal

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS 0 3

CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Expert System in Civil Engineering
Course Code: 148204
Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Students will be able to explain and describe the concepts central to the creation of knowledge bases and expert systems
CO2	Students will be knowledgeable about the tools and the processes used for the creation of an expert system.
CO3	Student will know methods used to evaluate the performance of an expert system.
CO4	Students will be able to conduct an in-depth examination of an existing expert system with an emphasis on basic methods of creating a knowledge base.
CO5	Students will be able to examine properties of existing systems in a case-study manner, comparing differing approaches.

Course Contents

Module 1: Introduction

History of expert system research e.g. quittance with researchers and

Their research fields. Current research activities. Conventional programs

vs. Expert Systems Advantages and limitations of expert systems

Module 2: Architecture of an expert system

Components of expert system

Knowledge base, Inference mechanism

User Interface

Module 3: Knowledge base

Knowledge Engineering. Nature of expert knowledge., Knowledge

acquisition and knowledge representative e.g. rule based systems,

Semature nets, frames, Validity nature base , working memory

Module 4: Inference Engine and user interface, Techniques for inference

mechanism, forward chaining and backward chaining , Interface

language, terminal interface

Module 5: Development of expert systems

Problem formulation, Search spaces, Task for expert system, application

to engineering analysis and design, Consideration , Operations

Representative application in Civil Engineering

References:

1. A guide to expert system- Waterman D.A.
2. Introduction to expert systems- Jackson, P

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Advanced Foundation Engineering

Course Code: 148205

Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Identify a suitable foundation system for a structure.
CO2	Evaluate the importance of raft foundation and principles of design for buildings and tower structures
CO3	Analyze and design pile foundations
CO4	Examine and discuss various machine foundations
CO5	Analyze and design Sheet piles and cofferdams

Course Contents

Module 1:Criteria for foundation choice, bearing capacity, total and differential settlement, tolerance for various types of structures, Interpretation of soil profile for design parameters like modulus of compressibility, modulus of sub grade reaction, Poisson ratio etc., Raft foundations for buildings and tower structures including effects of soil structure interaction and non-linearity, different types of rafts and , methods of analysis , precautions for construction of shallow foundations, Pile foundations, types, method of installation codal practices for permissible loads under vertical and lateral loads, Diaphragm walls, design and construction, foundations for heavy structures, well and caisson foundations, Equipment foundation subjected to dynamic loads. Underground structures, strategies for instrumentation and monitoring of foundation performance.

References

1. Foundation analysis and design- Bowles, J.E.
2. Foundation Engg- Pech, Hansen and Thornburn.

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Probabilistic Methods in Civil Engineering

Course Code: 14820

Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Estimate the error.
CO2	Apply the relevant numerical method for interpolating the polynomial
CO3	Develop the equation to be fitted and fit the curve for given data
CO4	Estimate numerically the solution of given algebraic equation.
CO5	Use the relevant method for solving the simultaneous linear equations and compute the Eigen values

Course Contents

Module 1: Application of basic probability concepts and standard probability distributions of random phenomenon in civil Engineering Systems- statistic of extremes, statistical estimation of parameters from experimental data point estimators and interval estimators, Hypothesis testing of civil Engineering models, elements of quality assurance- acceptance sampling by attributes and by variables- multistage sampling, decision analysis concepts of utility theory posterior analysis –preposterous analysis, elements of reliability theory, applications to design and operations of civil Engineering Systems.

References:

1. Linear Programming- G.Hardley.
2. Linear Programming by L. S. Shrinath

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Solid Mechanics
Course Code: 147208:

Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Analyze bodies for stresses and strains.
CO2	Analyze prismatic bars and tubes subjected to torsion.
CO3	Analyze beams and thick cylinders for elate-plastic loading
CO4	Develop the equation to be fitted and fit the curve for given data
CO5	Estimate numerically the solution of given algebraic equation.

Course Contents

Module 1: Theory of stress, state of stress in a body, Differential equations of equilibrium. Analysis of state of stress at a given point in a body, geometrical theory of strains, displacement components and strain components and relation between them, generalized

hooks law, strains expressed in terms of stresses, stresses expressed in terms of strains, torsion of prismatic bars and bending, Saint- Venant method, three dimensional stress systems , tensors, unsymmetrical bending.

References

1. Theory of elasticity- S.Timoshenko
2. Theory of elasticity-M.Filonenko
3. Solid mechanics-S.H. Crandall

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	**2.4**	**2.6**	**2.4**	**2.4**	**1.8**	**1.5**	**1.5**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.2**	**2.2**	**2.4**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

Course Name: Advanced Structure Design and Detailing

Course Code146209:

Semester: 2nd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Design RCC structural elements for ductility requirements as per IS 13920 2916
CO2	Apply new techniques for controlling the vibrations of the structures
CO3	Evaluate natural frequency of continuous elements/systems
CO4	Design elevated water tank for dynamic loading
CO5	Apply IS code clauses masonry structures for improving resistance to earthquake forces

Course Contents

Module 1: Introduction to limit state method of design, provisions in the Indian standard codes for loading wind loads and seismic loads, design and detailing of concrete structures.
Module 2: BIS Handbook for design, Examples of design using handbook.
Module 3: Design of Structures as per I.S. 1893 for Earthquake Resistant Design Construction.
Module 4: Design and Detailing Requirements as per 4326-1993.
Module 5: Design and Detailing of Earthen Buildings as per 13827-1993.
Module 6: Design and Detailing of Masonry Structures as per I.S. 13828-1993
Module 7: Design and Ductile Detailing of R.C.C. Structures as per I.S. 13920-1993
Module 8: Repair and Seismic Strengthening of Buildings as per I.S. 13935-1993.

References:

1. Dayaratnam, P. Reinforced Concrete Structure
2. Jain, A.K. Reinforced Concrete, Limit State Method of Design.
3. Punmia, B.C. Reinforced Concrete Structures, Vol II
4. Jain and jaikrishna Plain and Reinforced Concrete Vol II.
5. Design of Steel Structures by P.Dayaratnam
6. Design of Steel Structures by S.K. Duggal
7. B.I.S. Codes 1893, 4326, 13827, 13828, 13920, 13935

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	2	1	2	2	1	1	1	2	1	1
CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	**1.75**	**1.75**	**1.75**	**1.75**	**1.25**	**1.5**	**1.25**	**2**	**2**	**1.25**	**1**	**1**	**1.5**	**1.5**	**1.5**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

Course Name: Theory and Design of Shell

Course Code:- 148301

Semester: 3rd

Credits: 4 **L T P**

4 0 0

Course Outcomes: On successful completion of this course, the students will able to learn:

CO1	Analyze single and multi-degree freedom systems by fundamental theory and equations of motion
CO2	Analyze single and multi-degree freedom systems by numerical methods
CO3	Apply principles of planning, structural systems for seismic resistant to structures
CO4	Determine causes of earthquake and its effect on human
CO5	Understand the Codal Provisions during the design of Shells

Course Contents

Module 1: Classification of Shells-membrane and bending theory for singly curved and doubly curved shells. Various approximations- design of cylinder shells. HP shells, conoids-analysis of folded plates-design of diaphragms – detailing of reinforcements for shells – formwork for shells and folded plates.

References:

1. Theory of Plates and Shells by Timoshenko, S.
2. Concrete Shell Roofs by Ramaswamy

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	2	1	2	2	1	1	1	2	1	1
CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	**1.75**	**1.75**	**1.75**	**1.75**	**1.25**	**1.5**	**1.25**	**2**	**2**	**1.25**	**1**	**1**	**1.5**	**1.5**	**1.5**

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

Course Name Finite Element Methods

Course Code: 148302

Semester: 3rd

Credits: 4 **L T P**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO1	To demonstrate the ability to create models for trusses, frames, plate structures, machine parts, and components using ANSYS general-purpose software
CO2	To model multi-dimensional heat transfer problems using ANSYS
CO3	To demonstrate the ability to evaluate and interpret FEA analysis results for design and evaluation purposes;
CO4	To develop a basic understanding of the limitations of the FE method and understand the possible error sources in its use
CO5	Analysis of plate bending-basic equations of thin plate theory

Course Contents

Module 1: Basic equations of solid mechanics-review of equilibrium conditions, strain – displacement relations, stress – strain relations, principles of virtual work and stationary potential energy and various formulations.

Module 2: Approximate methods Rayleigh, Ritz weighted residual (Galerkin's) and finite difference methods.

Module 3: Finite element method: displacement model-shape functions Lagrange and Serendipity elements. Element properties-isoperimetric elements-numerical integration technique assemblage of elements and solution technique for static analysis.

Module 4: Analysis of framed structures-2D & 3D truss and beam element and applications.

Module 5: Analysis of plan stress/strain and ax symmetric solids-triangular, quadrilateral and isoperimetric elements, incompatible modes. Three dimensional stress analysis-isoperimetric 8 and 20 nodded elements. Analysis of plate bending-basic equations of thin plate theory Reissinner-Mindlin theory- plate elements and applications. Analysis of shells-degenerated shell elements. Finite element programming and FEA software.

References:

1. Finite Element Analysis – Theory and Programming by Krishnamurthy, C.S.

2. Numerical Method in Finite Element Analysis by Bathe, K.J. & Wilson, E.L.

Annexure-4

ACADEMIC INSTURCTIONS

Attendance Requirements

A student shall have to attend 75% of the scheduled periods in each course in a semester; otherwise he / she shall not be allowed to appear in that course in the University examination and shall be detained in the course(s). The University may condone attendance shortage in special circumstances (as specified by the Guru Kashi University authorities). A student detained in the course(s) would be allowed to appear in the subsequent university examination(s) only on having completed the attendance in the program, when the program is offered in a regular semester(s) or otherwise as per the rules.

Assessment of a course

Each course shall be assessed out of 100 marks. The distribution of these 100 marks is given in subsequent sub sections (as applicable).

	Internal (50)						**External (50)**	**Total**
Components	**Attendance**	**Assignment**			**MST 1**	**MST2**	**ETE**	
		A1	A2	A3				
Weightage	10	10	10	10	30	30	50	
Average Weightage	10	10			30		50	100

Passing Criteria

The students have to pass both in internal and external examinations. The minimum passing marks to clear in examination is 40% of the total marks.